



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/823,482      | 03/30/2001  | Erik Cota-Robles     | 042392.P9774        | 5734             |

8791 7590 06/01/2005

BLAKELY SOKOLOFF TAYLOR & ZAFMAN  
12400 WILSHIRE BOULEVARD  
SEVENTH FLOOR  
LOS ANGELES, CA 90025-1030

EXAMINER

ALI, SYED J

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

2195

DATE MAILED: 06/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/823,482

Applicant(s)

COTA-ROBLES ET AL.

Examiner

Syed J. Ali

Art Unit

2195

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 17 March 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3-8,10,11,13-26,28-31,33-40,42 and 44 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-8,10,11,13-26,28-31,33-40,42 and 44 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>11/18/04; 3/14/05</u> | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

1. This office action is in response to the amendment filed March 17, 2005. Claims 1, 3-8, 10-11, 13-26, 28-31, 33-40, 42, and 44 are presented for examination.
2. The text of those sections of Title 35, U.S. code not included in this office action can be found in a prior office action.

***Claim Rejections - 35 USC § 102***

3. **Claims 1, 3-8, 10-11, 13, 16, 19, 23-26, 28, 31, 33-34, 36, 40, 42, and 44 are rejected under 35 U.S.C. 102(e) as being anticipated by Bugnion et al. (USPN 6,496,847) (hereinafter Bugnion).**

4. As per claims 1, 8, 11, 26, 31, 40, 42, and 44 Bugnion teaches the invention as claimed, including a hardware platform including a hardware component of a soft device (col. 7 lines 12-25);

constructing a soft device, comprising implementing a driver of the soft device in a virtual machine monitor (col. 4 lines 52-61); and

making the soft device available for use by one or more virtual machines coupled to the virtual machine monitor (col. 7 lines 12-25).

5. As per claims 3, 10, 13, 16, 19, 28, 33-34, and 36, Bugnion teaches the invention as claimed, including exporting an emulation of a fixed function hardware device to said any of the one or more virtual machines (col. 7 lines 12-25);

Art Unit: 2195

by presenting the first virtual machine to the second virtual machine as an external, internal, or hardware device (col. 8 lines 5-19); and

emulating communication between the first virtual machine and the second virtual machine (col. 15 line 58 - col. 16 line 3).

6. As per claim 4, Bugnion teaches the invention as claimed, including performing computations requested by said any of the one or more virtual machines without notifying a residual fixed function device (col. 8 lines 33-52).

7. As per claim 5, Bugnion teaches the invention as claimed, including transferring an operation requested by said any of the one or more virtual machines to a residual fixed function device (col. 8 lines 33-46); and

the residual fixed function device performing the operation requested by said any of the one or more virtual machines (col. 8 lines 5-19).

8. As per claim 6, Bugnion teaches the invention as claimed, including performing a portion of computations requested by said any of the one or more virtual machines to a residual fixed function device (col. 8 lines 5-19; col. 8 lines 33-52); and

performing a set of operations on hardware registers of a residual fixed function device to complete a task requested by said any of the one or more virtual machines (col. 9 lines 41-51).

Art Unit: 2195

9. As per claim 7, Bugnion teaches the invention as claimed, including manipulating data stored in memory to effect zero or more transformations (col. 7 lines 32-45); and

transferring data to or from a residual hardware device using a direct memory access (DMA) technique (col. 7 lines 32-45; col. 12 lines 6-19).

10. As per claim 23, Bugnion teaches the invention as claimed, including configuring the first virtual machine to match the hardware device (col. 7 lines 12-25).

11. As per claim 24, Bugnion teaches the invention as claimed, including the software component of the soft device comprises at least a portion of software of a fixed function device (col. 8 line 66 - col. 9 line 19).

12. As per claim 25, Bugnion teaches the invention as claimed, including varying the portion of software that is used as the software component depending on how closely the first virtual machine matches the hardware device (col. 8 line 66 - col. 9 line 19).

***Claim Rejections - 35 USC § 103***

13. **Claims 14-15, 17-18, 20-22, 29-30, 35, and 37-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bugnion in view of Lim et al. (USPN 6,795,966) (hereinafter Lim).**

Art Unit: 2195

14. As per claim 14-15, 17-18 20-22, 29-30, 35, and 37-39, Lim teaches the invention as claimed, including emulating communication by providing a virtualized device (col. 7 lines 38-45; col. 14 lines 28-33) that provides a communication link between the first and second virtual machines by linking the virtualized device to the soft device and trapping and reflecting access to the virtualized devices (col. 7 lines 45-54; col. 14 lines 33-43), wherein the virtualized device is any one of a PCI card, an external USB device, an internal USB device, a network interface card, and any other standard personal computer device (col. 16 lines 16-34).

15. It would have been obvious to one of ordinary skill in the art to combine Bugnion and Lim as the method disclosed by Bugnion provides all the necessary tools to virtualize an entire computer system, but does not specifically mention how communication is handled between virtual machines that are acting as peripheral devices. There is a great deal of overlap in the disclosures of Bugnion and Lim, but Lim is cited to show that a virtual machine can be used to emulate any type of peripheral device and appear to the host operating system as though it were the original device. All communications that are normally routed through the peripheral device go through the virtual machine, and the virtual machine transparently communicates with the physical resources. As any component can be virtualized, the typical manner in which a device operates is inherently implemented within the virtual machine.

#### *Response to Arguments*

16. **Applicant's arguments filed March 17, 2005 have been fully considered but they are not persuasive.**

Art Unit: 2195

17. Applicant argues, *"Bugnion discloses implementing the driver in the host operating system, which is not the same as implementing a driver in the virtual machine monitor."*

18. Examiner respectfully disagrees. While the driver is downloaded to and is resident in the host operating system, this does not preclude the driver from also being "implemented" in the virtual machine monitor. For a driver to be implemented in the virtual machine monitor, all that is required is that it be given practical effect from the virtual machine monitor. This is clearly a supported feature of Bugnion.

Bugnion teaches constructing a system architecture such that the host operating system and virtual machine monitor are co-resident at the system level. This allows the virtual machine to use components of the hardware directly, as the virtual machine monitor has complete access to the entire address space. When the virtual machine seeks to assert control over the system, a total switch occurs between the host operating system and the virtual machine monitor, such that all internal registers, memory, drivers, etc. are mapped to the virtual machine. This is required such that the host operating system yields to the virtual machine; else the purpose of the virtual machine monitor would be frustrated. This is all achieved by providing a cross page in memory, which allows simple switching between contexts of the host operating system and virtual machine monitor. Thus, the virtual machine monitor has complete control over the address space, which includes the driver. The fact that the address space is shared in this manner is enough to say that the driver is implemented both in the host operating system and the virtual machine monitor. However, by also giving the virtual machine monitor such a high level of access, it is able to issue any instruction to the hardware device. The ability of the virtual

Art Unit: 2195

machine monitor to give practical effect to the hardware devices via the driver indicates that the driver is also implemented in the virtual machine monitor.

### *Conclusion*

19. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Syed J Ali whose telephone number is (571) 272-3769. The examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai T An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



Art Unit: 2195

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Syed Ali  
May 20, 2005



MENG-AL T. AN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2100